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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/745,705	12/21/2000	Lawrence D. Wong	42390P9859	9709

7590

07/16/2003

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EXAMINER

VU, HUNG K

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 07/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/745,705

Applicant(s)

WONG, LAWRENCE D.

Examiner

Hung K. Vu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 April 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-9 and 11-26 is/are pending in the application.
- 4a) Of the above claim(s) 11-23 and 25 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 24 and 26 is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin (PN 6,297,554, of record) in view of Gnade et al. (PN 5,470,802, of record).

Lin discloses, as shown in Figure 8, a process comprising,

forming a first dielectric layer (60) on a substrate (52,54,not shown), wherein the first dielectric layer has a dielectric constant;

patterning the first dielectric layer such that a plurality of vertically oriented posts (60) are formed, the post having a top surface;

forming a second dielectric layer (82) over and adjacent to the posts, the second dielectric layer having a top surface and substantially filling up the area adjacent to the posts, wherein the second dielectric layer has a dielectric constant, the dielectric constant of the first layer being higher than the dielectric constant of the second layer;

wherein the plurality of vertically oriented posts are used to provide mechanical reinforcement of the second dielectric layer;

polishing the second dielectric layer such that its top surface is substantially even with the top surfaces of the posts;

after forming the second dielectric layer, forming an inlaid metal interconnection in the second dielectric layer.

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Lin does not disclose the second dielectric layer making up the bulk of an inter-layer dielectric material. However, Gnade et al. discloses a plurality of vertically oriented posts (58) and a second dielectric layer (28) making up the bulk of an inter-layer dielectric material. Note Figure 8D of Gnade et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the second dielectric layer of Lin as the bulk of the inter-layer dielectric material, such as taught by Gnade et al. in order to further reduce the RC time delay effect between the adjacent conductive layers.

With regard to claim 2, Lin and Gnade et al. disclose the substrate comprises a dielectric material.

With regard to claim 3, Lin and Gnade et al. disclose the substrate is a material selected from the group consisting of silicon carbide, silicon nitride, and carbon doped oxides of silicon.

With regard to claim 4, Lin and Gnade et al. disclose the process further comprising curing the second dielectric layer.

With regard to claim 5, Lin discloses all of the claimed limitations except the process further comprising aging the second dielectric layer. However, Gnade et al. discloses a process comprising forming a dielectric layer (28) and aging the dielectric layer. Note Col. 6, lines 61-64 of Gnade et al.. Therefore, it would have been obvious to one of the

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ordinary skill in the art at the time the invention was made to form and age the dielectric layer of Lin, such as taught by Gnade et al. in order to remove the solvent from the pores.

With regard to claim 6, Lin and Gnade et al. disclose the process further comprising forming dual damascene openings in the second dielectric layer.

With regard to claim 7, Lin and Gnade et al. disclose forming the first dielectric layer comprises depositing an oxide of silicon.

With regard to claim 8, Lin and Gnade et al. disclose forming the second dielectric layer comprises chemical vapor deposition of a low-k material.

With regard to claim 9, Lin discloses all of the claimed limitations except forming the second dielectric layer comprises spinning on a low-k material. However, Gnade et al. discloses a process of forming a dielectric layer (28) comprises spinning on a low-k material. Note Col. 6, lines 44-47 of Gnade et al.. Therefore, it would have been obvious to one of the ordinary skill in the art at the time the invention was made to form the second dielectric layer of Lin comprises spinning on a low-k material, such as taught by Gnade et al. in order to improve the gaps filling between the structures.

***Allowable Subject Matter***

2. Claims 24 and 26 are allowed.

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***Response to Arguments***

3. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (703) 308-4079. The examiner can normally be reached on Mon-Thurs 7:00-4:30, alternate Friday 7:00-3:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for

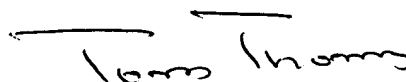
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the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Vu

July 9, 2003



TOM THOMAS  
SUPERVISORY PATENT EXAMINER  
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